CLAIMS

1. A position sensor assembly comprising:

a first pole piece;

a second pole piece;

a primary sensor disposed between the first and section pole pieces, wherein said first and second pole pieces form a primary flux path through the primary sensor and permit a leakage flux path outside the primary sensor; and

a secondary sensor disposed in the leakage flux path.

2. The position sensor assembly of claim 1, wherein said leakage flux path produces a voltage output from the secondary sensor proportional to a voltage output of the primary sensor produced by the primary flux path.

3. The position sensor assembly of claim 1, further comprising a voltage detector in electrical communication with the primary sensor and the secondary sensor.

4. The position sensor assembly of claim 3, further comprising a processor in communication with the voltage detector, said voltage detector being adapted to send a detected voltage output of the primary sensor and of the secondary sensor to the processor; said processor including one or more predetermined voltages stored in an associated memory; and

said processor comparing at least one of the voltage outputs of the primary sensor and the secondary sensor to said one or more predetermined voltages and said processor being

adapted to generate a signal upon a selected proximity of the at least one voltage output to the one or more predetermined voltages.

5. The position sensor assembly of claim 1, wherein the first pole piece is generally in an L-shape and the second pole piece is generally in an L-shape, with the first and second pole pieces arranged to form a generally U-shaped flux gathering pole.

6. The position sensor assembly of claim 5, wherein the primary sensor is positioned between an end of each of the first and second pole pieces.

7. The position sensor assembly of claim 6, wherein a branded surface of the primary sensor is in contact with the end of at least one of the first and second pole pieces.

8. The position sensor assembly of claim 1, wherein the secondary sensor is aligned immediately adjacent to the primary sensor.

9. The position sensor assembly of claim 1, wherein the secondary sensor is in contact with the primary sensor.

10. The position sensor assembly of claim 1, wherein the secondary sensor is arranged perpendicularly to the primary sensor.

11. A position sensor assembly, comprising:

a primary sensor including at least one Hall Effect sensing element being responsive to magnetic fields;

a secondary sensor including at least one Hall Effect sensing element being responsive to magnetic fields;

a U-shaped flux-gathering pole piece for collecting and directing magnetic flux at least to the primary sensor, the flux-gathering pole piece being constructed by the symmetric placement of a first and a second L-shaped section of magnetically permeable material forming a U-shape with a bifurcated base, the bifurcated base of the U-shaped pole piece having a gap separating the first and second L-shaped sections;

said primary sensor being disposed between an end of each of the first and second L-shaped portions; and

a magnetic flux source for generating a magnetic field that varies in a substantially linear manner.

12. The position sensor assembly of claim 11, further comprising a first asymmetric Y-shaped portion extending from the first L-shaped section, the first asymmetric Y-shaped portion having a head including first and second ends extending in a direction of the second L-shaped section;

a second asymmetric Y-shaped portion extending from the second L-shaped section, the second asymmetric Y-shaped portion having a head including first and second ends extending in a direction of the first L-shaped section;

said primary sensor being arranged between the first ends of the first and second asymmetric Y-shaped portions; and

said secondary sensor being arranged between the second ends of the first and second asymmetric Y-shaped portions.

13. The position sensor assembly of claim 12, further comprising an adapter disposed between the secondary sensor and the second ends of the first and second asymmetric Y-shaped portions.

14. The position sensor assembly of claim 13, wherein the adapter is comprised of an electrically insulating material.

15. The position sensor assembly of claim 14, wherein the electrically insulating material is plastic.

16. The position sensor assembly of claim 11, wherein the secondary sensor is positioned immediately adjacent the primary sensor, and wherein the Hall Effect sensing element of the primary sensor and the Hall Effect sensing element of the secondary sensor are aligned with one another and are oriented normal to the ends of the L-shaped portions.

17. The position sensor assembly of claim 11, wherein the secondary sensor is positioned perpendicularly to the primary sensor, and wherein the Hall Effect sensing element of the secondary sensor is perpendicular to the Hall Effect sensing element of the primary sensor, whereby a distance separating the Hall Effect sensing elements of the primary and secondary sensors is minimized.

18. A position sensor assembly comprising:

a sensor housing;

a U-shaped pole piece aligned by the sensor housing, said U-shaped pole piece including a first L-shaped section and a second L-shaped section, wherein the first L-shaped

section terminates at an asymmetric Y-shaped portion and the second L-shaped section terminates at a second asymmetric Y-shaped portion;

a primary sensor positioned between a first end of each of the first and second asymmetric Y-shaped portions, said first end of each of the first and second asymmetric Y-shaped portions being at a head of the respective asymmetric Y-shaped portion; and

a secondary sensor positioned between a second end of each of the first and second asymmetric Y-shaped portions, said second end of each of the first and second asymmetric Y-shaped portions also being at the head of the respective asymmetric Y-shaped portion.

19. The position sensor assembly of claim 18, wherein the primary sensor includes at least one sensing element arranged normal to the first ends of the first and second asymmetric Y-shaped portions.

20. The position sensor assembly of claim 19, wherein the secondary sensor includes at least one sensing element arranged normal to the second ends of the first and second asymmetric Y-shaped portions.

21. The position sensor assembly of claim 18, further comprising:

an adapter disposed between the secondary sensor and at least the second end of one of the first and second L-shaped sections.

22. The position sensor assembly of claim 21, wherein the adapter is comprised of an electrically insulating material.

23. The position sensor assembly of claim 22, wherein the electrically insulating material is plastic.

24. The position sensor assembly of claim 21, wherein the adapter is positioned between the secondary sensor and the second ends of both of the first and second asymmetric Y-shaped portions.

25. The position sensor assembly of claim 24, wherein the adapter creates an air gap between the secondary sensor and the second ends of both of the first and second asymmetric Y-shaped portions.

26. The position sensor assembly of claim 25, wherein the air gap is approximately 0.13 inch.

27. The position sensor assembly of claim 18, wherein the secondary sensor operates as a limit switch, and said primary sensor is arranged to experience a larger percentage of magnetic flux from the U-shaped pole piece than the secondary sensor.

28. A method for detecting relative position, including:

providing a first pole piece and a second pole piece in proximity to a magnetic flux source;

providing a first position sensor having at least one Hall Effect sensing element therein in a primary flux path formed by the first and second pole pieces;

providing a second position sensor having at least one Hall Effect sensing element therein in a leakage flux path outside the first position sensor.

29. The method of claim 28, including placing the first position sensor in intimate contact with at least one of the pole pieces.

30. The method of claim 29, wherein the leakage flux path is provided at least in part by shunting flux away from the primary sensor.